



1960

Seventy-Third Annual Report, 1960, of the Tennessee Agricultural Experiment Station

University of Tennessee Agricultural Experiment Station

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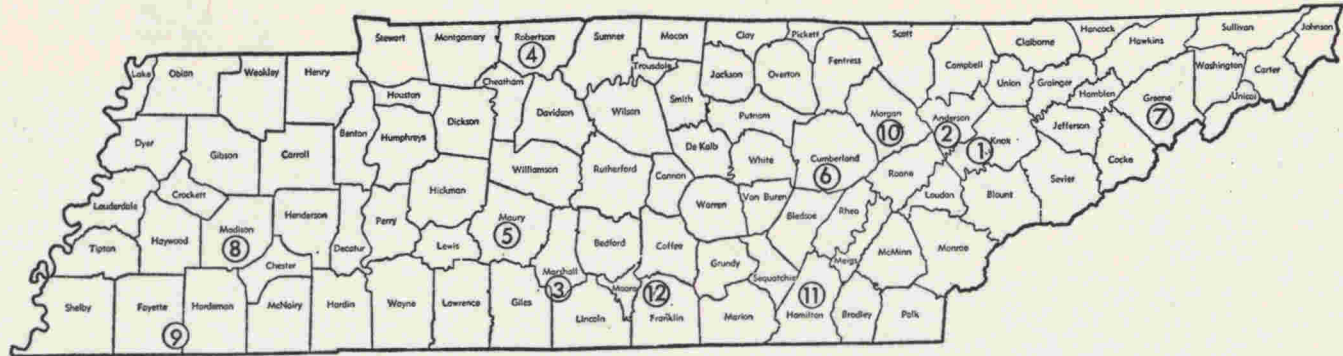
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**of the
TENNESSEE
AGRICULTURAL
EXPERIMENT
STATION**

**THE
UNIVERSITY
OF
TENNESSEE**

Knoxville

UNIVERSITY OF TENNESSEE AGRICULTURAL EXPERIMENT STATION



- 1 Main Station
- 2 U.T.-AEC Agricultural Research Laboratory

- 7 Tobacco Experiment Station
- 8 West Tennessee Experiment Station

BRANCH STATIONS

- 3 Dairy Experiment Station
- 4 Highland Rim Experiment Station
- 5 Middle Tennessee Experiment Station
- 6 Plateau Experiment Station

FIELD STATIONS

- 9 Ames Plantation
- 10 Cumberland Plateau Forestry Field Station
- 11 Friendship Forestry Field Station
- 12 Highland Rim Forestry Field Station

SEVENTY - THIRD

ANNUAL REPORT
1960

Tennessee Agricultural Experiment Station

Andrew D. Holt President of the University

Webster Pendergrass Dean of Agriculture

John A. Ewing Director

Eric Winters Associate Director

Florence L. MacLeod, Assistant Director,
Home Economics Research

THE UNIVERSITY OF TENNESSEE
KNOXVILLE

LETTER OF TRANSMITTAL

Knoxville, Tennessee
January 2, 1961

To His Excellency, Buford Ellington
Governor of Tennessee

SIR: I have the honor of transmitting herewith, on behalf of the Board of Trustees of the University of Tennessee, a report of the work and expenditures of the Agricultural Experiment Station for the year 1960.

This report is submitted in accordance with the law requiring that such a report be submitted annually by the administrators of the Experiment Station to the Governor of the State.

Respectfully submitted,
Andrew D. Holt, President

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FOREWORD

Included in this report are listings by departments of the following information:

- 1) Research projects active as of December 31, 1960;
- 2) Research projects terminated during the calendar year 1960;
- 3) Bulletins, articles, and reports prepared by Experiment Station staff members and published during the calendar year 1960.

In addition, this report contains the financial statement for the Agricultural Experiment Station covering the period July 1, 1959 to June 30, 1960. Also included is a list of the Experiment Station personnel for the calendar year.

Active Projects

As of December 31, 1960, there were 128 active Hatch projects and 15 active State projects. Hatch projects are supported in part with Federal-Grant funds made available by Congress to the Agricultural Experiment Stations of the country under the Hatch Act Amended. State projects are supported entirely by University funds.

The headquarters of the Tennessee Agricultural Experiment Station is located on the agricultural campus of The University of Tennessee at Knoxville. The UT-AEC Agricultural Research Laboratory is located some 20 miles distant at Oak Ridge, Tennessee. In addition, there are seven other research centers which represent soil and climatic conditions in the major regions of Tennessee. These other research centers, or sub-stations, are listed at the end of this report, and the locations are shown on the inside front cover.

Many of the projects involving studies of soils, crops, and livestock may include experimental work at one or more of the sub-stations as well as at the main station in Knoxville.

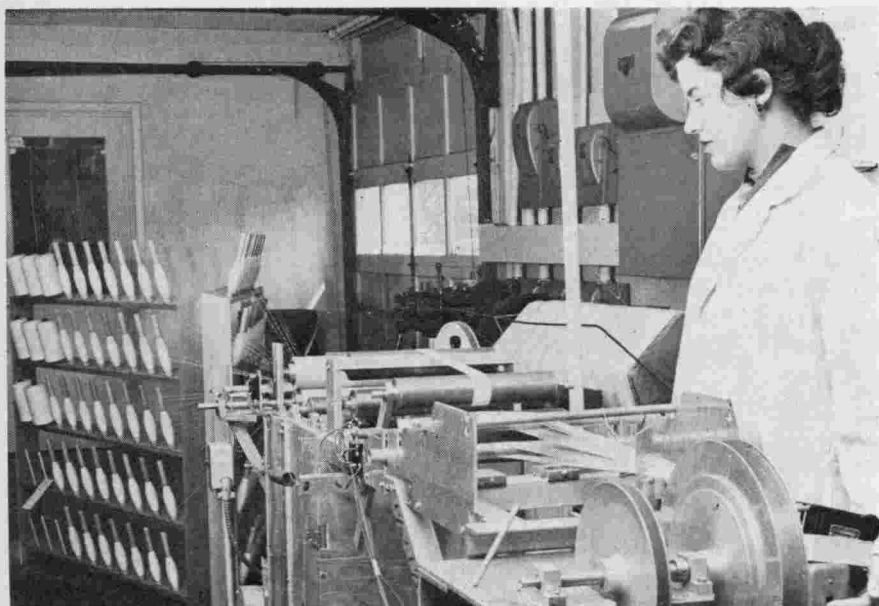
Projects Terminated

During 1960, thirteen projects were terminated. Reports on these projects have either been published or are being prepared for publication.

Publications

Published reports on research of the Tennessee Agricultural Experiment Station appear as Station Bulletins, in Tennessee Farm and Home Science, as well as in professional and technical periodicals and in various popular publications. There were 16 Station Bulletins published during the year. The number of technical, semi-technical and popular articles prepared by staff members and published during the year was 100.

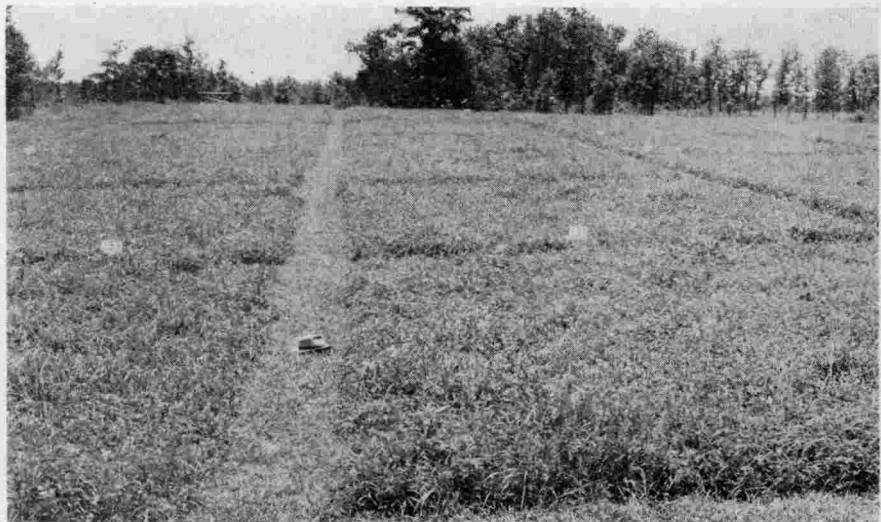
Copies of bulletins may be obtained by writing to the Editor, Agricultural Experiment Station, Knoxville. Copies of articles published in various journals and periodicals may sometimes be obtained by writing directly to the author.



HOME ECONOMICS RESEARCH: This equipment in the foreground is a miniature slasher used to prepare small samples of warp yarn for weaving. After weaving, the sample fabric is tested for its physical properties in the Home Economics Laboratory. Using this equipment cotton produced from a relatively few plants of an experimental line can be tested for its fabric properties before the variety is released to farmers.



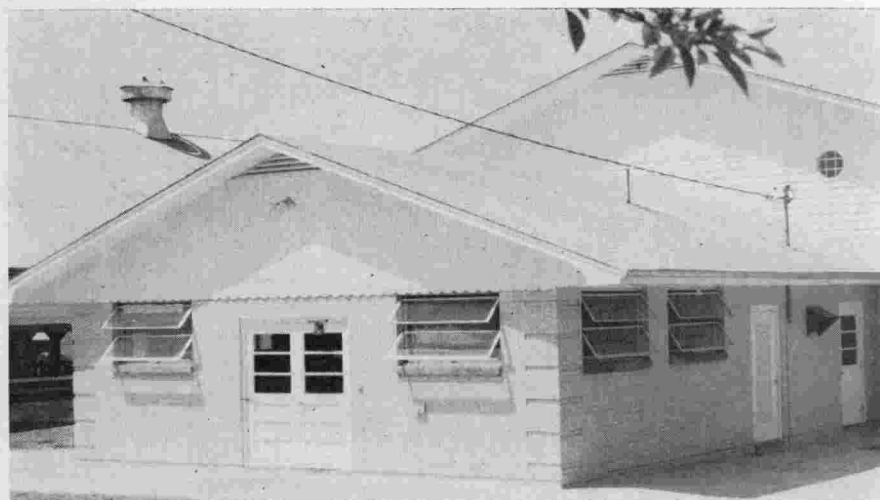
COTTON RESEARCH: Cotton grown in Tennessee is susceptible to a destructive disease—verticillium wilt. Cotton seeds were irradiated with gamma rays in the hope that genetic mutations having resistance to the disease would occur. Seeds from these plants were grown in the greenhouse and inoculated with verticillium wilt. A few plants survived, presumably because they are verticillium wilt-resistant. Seeds from surviving plants will be used in the breeding program.



SOIL AND WATER CONSERVATION: A pasture fertilizer experiment at the Plateau Experiment Station, Crossville. The highest fertilizer treatment on this pasture produced better than 3 tons per acre of air-dry forage as an average over a 4-year period. A heavy forage crop like this reduces runoff erosion, and enables farmers to produce livestock efficiently.



EXPERIMENTAL TILLAGE TOOL: An orchard cultivating machine was modified to incorporate lime and fertilizer in the subsoil. This machine follows a turning plow, mixing lime and fertilizer that have been applied at the bottom of the turned furrow. Research results from using this machine will tell whether or not deep-mixing of these materials will promote deeper and stronger root systems of crops and heavier top growth—aids in controlling soil erosion and in reducing water runoff. The Agricultural Engineering Department built the tool.



CAPITAL IMPROVEMENT ON THE SUBSTATIONS: An exterior view of the new 8-cow milking barn at the Dairy Experiment Station, Lewisburg. This is one of the major capital improvements installed on the substations in 1960. In order to conduct a high-quality research program over the state, certain research facilities must be modernized occasionally. This modern milking barn is an example.

FINANCIAL STATEMENT

THE UNIVERSITY OF TENNESSEE
AGRICULTURAL EXPERIMENT STATION

In Account With

The United States Appropriation under the Hatch Act Amended
and Non-Federal Funds, 1959-60

	HATCH	TITLE II	Non-Federal Funds
Receipts			
From United States Treasurer	\$863,012.00	\$1,603.05	
From Other Sources			\$1,118,702.46
Expenditures			
Personal Service	733,797.89	1,179.93	492,507.09
Travel	19,764.77		26,455.56
Transportation of Things	628.86		5,972.36
Communication Service	346.43		18,298.99
Rents and Utility Services	402.33		20,949.68
Printing and Binding	1,642.39	423.12	15,111.42
Other Contractual Services	10,235.31		97,079.17
Supplies and Materials	57,409.09		220,744.85
Equipment	29,529.09		92,504.23
Land and Structures	9,255.84		79,063.47
(Contractual)			
Contributions and Retirement			50,015.64
Total Expenditures	\$863,012.00	\$1,603.05	\$1,118,702.46

AGRICULTURAL ECONOMICS AND RURAL SOCIOLOGY

Proj. No.	Research Project Titles
Hatch 4	Farmers' Capital Needs and Problems of Capital Acquisition.
Hatch 5	Farming Adjustments in Tennessee with Emphasis on Economics of Conservation Farming; cooperative with the U. S. Department of Agriculture.
Hatch 6	Impact of Industrialization Upon Tennessee Agriculture.
Hatch 11	Economics of Marketing Milk in Tennessee; cooperative with the U. S. Department of Agriculture.
Hatch 12	Type and Breed as Factors Influencing Beef Carcass Characteristics and Consumer Acceptance; coopera-

- tive with the Department of Animal Husbandry-Veterinary Science and the U. S. Department of Agriculture.
- Hatch 13 A Study of the Marketing Methods of the Horticultural Specialty Industry in Tennessee; cooperative with the Department of Horticulture (contributing to Regional Proj. SM-12).
- Hatch 16 Marketing and Utilizing Low Quality Hardwoods.
- Hatch 17 A Study of Comparative Prices Paid Producers for Milk of Manufacturing Grade in Tennessee and the Midwest; cooperative with the U. S. Department of Agriculture.
- Hatch 19 Financial Management and Related Problems Affecting the Success of Tennessee Cooperatives.
- Hatch 22 An Economic Study of Feed and Forage Production and Use on Beef and Dairy Farms in Specified Areas of Tennessee.
- Hatch 23 Buying Policies and Other Practices in the Tennessee Vegetable Industry; cooperative with the Department of Horticulture (contributing to Regional Proj. SM-8).
- Hatch 24 Expansion of Demand for Horticultural Specialties; cooperative with the Department of Horticulture.
- Hatch 156 Fluid Milk Supplies, Prices, and Movement in the Lower Mississippi River Valley Marketing Area (contributing to Regional Proj. SM-10).
- Hatch 159 Level-of-Living Adjustment of Rural Households in Tennessee (contributing to Regional Project S-44).
- Hatch 175 Analysis of Movement of Livestock (Slaughter Hogs, Cattle, and Calves) and Meat (Pork, Beef, and Veal) in Tennessee (contributing to Regional Proj. SM-23).
- Hatch 179 An Economic Appraisal of Farming Adjustment Opportunities in Selected Areas of Tennessee to meet Changing Conditions; cooperative with TVA and the U. S. Department of Agriculture (contributing to Regional Proj. S-42).

- | | |
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| Hatch 189 | Market Potential for Frozen Broilers in Tennessee; cooperative with the U. S. Department of Agriculture (contributing to Regional Proj. SM-15). |
| Hatch 190 | Vertical Integration in the Marketing of Livestock in Tennessee. |
| Hatch 191 | Alternative Cotton Marketing Practices and Systems for Increased Efficiency in Channels of Trade (contributing to Regional Proj. SM-24). |
| State 11 | Changes in the Attitudes, Knowledge and Practices of Farmers Participating in a UT-TVA Trial-Acre Program; cooperative with TVA. |
| State 15 | Impact of Mechanization on Costs and Returns in Cotton Production; cooperative with the Agricultural Engineering, Agronomy, and Entomology Departments. |

Projects Concluded in 1960

- | | |
|-----------|--|
| Hatch 7 | Labor Requirements and Supply on Tennessee Farms. |
| Hatch 18 | An Economic Analysis of the Effects of Fires on Insurance and Other Costs at Gins in Tennessee (contributing to Regional Proj. SM-17). |
| Hatch 20 | Improving the Usefulness of Livestock Marketing Information. |
| Hatch 21 | Economic Analysis and Evaluation of the Use of Fiber Tests in the Marketing of Cotton (contributing to Regional Proj. SM-18). |
| Hatch 166 | Evaluation of Consumer Acceptance of Broilers of Various Degrees of Skin Pigmentation (contributing to Regional Proj. SM-15, Revised). |

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Organizational Problems of Small Watersheds, Tenn. Agric.
Expt. Sta. Bul. 310, 1960.

Cleland, Charles L.

Characteristics of Social Systems within Which Selected Types of Information are Transmitted. *Rural Sociology* 25 (2):212-218, 1960.

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The Midwest—Eastern Seaboard Conflict of Interest in the Production and Distribution of Milk—The Role of Market Structures and Other Institutional Arrangements in the Conflict. *Jour. of Farm Econ.* 42 (5), Dec. 1960.

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Manufacturing Milk Prices in Tennessee and Other Areas. *Tenn. Agric. Expt. Sta. Bul.* 317, 1960.

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Goble, William E.

The Knoxville Wholesale and Retail Produce Markets—Use, Facilities, and Needed Improvements. *Tenn. Agric. Expt. Sta. Bul.* 315, 1960.

Goble, William E. and Ivon E. McCarty

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Martin, Joe A. and B. H. Luebke

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Labor Requirements on Tennessee Farms. Tenn. Agric. Expt. Sta. Bul. 316, 1960.

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Cotton Gin Fires and Losses in Tennessee. Tenn. Agric. Expt. Sta. Bul. 309, 1960.

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Raskopf, B. D.

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Cotton Fiber Testing by Shippers and Spinners in Tennessee and The United States. Tenn. Agric. Expt. Sta. Bul. 320, 1960.

AGRICULTURAL ENGINEERING

Proj. No.	Research Project Titles
Hatch 26	Food Processing Machinery Development.
Hatch 27	Drying and Handling Forage Crops for Hay and Silage.
Hatch 32	Chemical Weed Control; cooperative with the Agronomy and Horticulture Departments.
Hatch 169	Storage and Management of Water for Irrigation.
Hatch 172	Housing for Chicks; cooperative with the Department of Poultry.
State 6	Mechanical Handling of Silage; cooperative with the Animal Husbandry-Veterinary Science and Dairy Husbandry Departments.
State 7	Electric Treatment of Plant Materials; cooperative with the Agronomy, Food Technology and Home Economics Departments and the U. S. Department of Agriculture.
State 15	Impact of Mechanization on Costs and Returns in Cotton Production; cooperative with the Agricultural Economics and Rural Sociology, Agronomy and Entomology Departments.

Projects Concluded in 1960

State 10	The Development of Mechanical Equipment for Minimum Strip Tillage.
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Bulletins, Articles, and Reports

Boyce Erwin K.

What Type Grain Dryer for You? *Tenn. Farmer and Home-maker*, Aug. 1960.

Drury, L. N., and D. O. Baxter

Poultry Houses and Equipment for the South. *Agric. Engr.*, pp. 580-583, Sept. 1960.

Luttrell, Houston, and C. W. Bockhop

Hay in the Barn One Day Sooner When Conditioned. *Tenn. Farm and Home Sci., Prog. Rep.* 33, March 1960.

AGRONOMY

Proj. No.	Research Project Titles
Hatch 28	Moisture Sorption Characteristics of the Major Soils of Tennessee and the Relation of Moisture Tensions to Plant Growth and Fertilizer Utilization; cooperative with TVA and the U. S. Department of Agriculture, (contributing to Regional Proj. S-24).
Hatch 32	Chemical Weed Control; cooperative with the Agricultural Engineering and Horticulture Departments.
Hatch 33	Evaluation of the Performance of Varieties of Field Crops.
Hatch 34	Corn Improvement; cooperative with the Department of Entomology and the U. S. Department of Agriculture.
Hatch 37	Production of Burley Tobacco; cooperative with the U. S. Department of Agriculture.
Hatch 38	The Comparative Value and Relative Efficiency of Various Phosphate Fertilizers Under Different Soil and Cropping Conditions; cooperative with TVA.
Hatch 39	Improvement of Cultivated Grasses.
Hatch 42	Potassium Fertilization of Farm Crops on Different Soil Series in Tennessee.
Hatch 45	Movement and Persistence of Herbicides in the Soil (contributing to Regional Proj. S-18).

- Hatch 47 Establishment and Maintenance of Turf.
- Hatch 48 Soil Survey of Tennessee to Help Determine Crop Adaptations and Management Requirements; cooperative with TVA and the U. S. Department of Agriculture.
- Hatch 49 Determination of Residues from Certain Pesticides When Applied for the Normal and Experimental Control of Insects and Diseases of Fruits and Forage Crops in Tennessee; cooperative with the Department of Entomology (contributing to Regional Proj. S-22).
- Hatch 51 Root Development of Farm Crops as Related to the Physical and Chemical Characteristics of the Soil; cooperative with TVA.
- Hatch 52 Evaluation of Different Pasture Species in Various Combinations and at Varying Rates of Nitrogen Fertilization as Reflected in Beef Cattle Gains and Forage Yields; cooperative with the Department of Animal Husbandry-Veterinary Science.
- Hatch 55 The Influence of Chemical, Physical, and Mineralogical Properties of Soils on Nutrient Availability and Plant Growth; cooperative with the U. S. Department of Agriculture (contributing to Regional Proj. S-14).
- Hatch 56 Trace Elements in Tennessee Agriculture Crops.
- Hatch 163 Culture of Dark Tobacco.
- Hatch 164 Nitrogen Fertilization of Farm Crops.
- Hatch 183 Crop Response to Liming.
- Hatch 184 Effects of Environmental Factors on Ladino Clover and Orchardgrass Persistence (contributing to Regional Proj. S-47).
- Hatch 186 Forage Crops Management: Establishment, Persistence, and Productivity.
- State 7 Electric Treatment of Plant Materials; cooperative with the Agricultural Engineering, Food Technology, and Home Economics Departments and the U. S. Department of Agriculture.

State	9	Land Reclamation.
State	13	Changes in Attitudes, Knowledge and Practices of Farmers Participating in a UT - TVA Trial - Acre Program; cooperative with TVA.
State	15	Impact of Mechanization on Costs and Returns in Cotton Production; cooperative with the Agricultural Economics and Rural Sociology, Agricultural Engineering, and Entomology Departments.
State	57	Evaluation of New Plants; cooperative with the Department of Horticulture.

Projects Concluded in 1960

Hatch	54	Effect of Certain Insecticides and Herbicides upon the Biochemical Activities of the Soil and Upon Plant Growth.
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- Andrews, Henry, J. D. Burns, and J. R. Overton.
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Brush Control with the Substituted Ureas. Proc. 13th. Southern Weed Conf. 13:105-108, 1960.
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Alfalfa with IVP for Tennessee. Special Pub., Tenn. Agric. Ext. Serv., 1960.
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- Parks, W. L. and Henry Andrews.
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Response to Nitrogen Fertilization. Farm Forum No. 66,
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ANIMAL HUSBANDRY - VETERINARY SCIENCE

Proj. No.	Research Project Titles
Hatch 12	Type and Breed as Factors Influencing Beef Carcass Characteristics and Consumer Acceptance; cooperative with the Department of Agricultural Economics and Rural Sociology and the U. S. Department of Agriculture.

- Hatch 50 The Effects of Certain Atmospheric Effluents Upon the Growth and Composition of Plants, and Upon Animal Life, at Locales in East and Central Tennessee.
- Hatch 52 The Evaluation of Different Pasture Species in Various Combinations and at Varying Rates of Nitrogen Fertilization as Reflected in Beef Cattle Gains and Forage Yields; cooperative with the Department of Agronomy.
- Hatch 58 Studies of Endocrine Relationships in Farm Animals—Swine.
- Hatch 60 Studies of Endocrine Relationships in Farm Animals—Beef Cattle.
- Hatch 61 The Improvement of the Producing Ability of Beef Cattle; cooperative with the U. S. Department of Agriculture (contributing to Regional Proj. S-10).
- Hatch 63 Mineral Metabolism in Animals: I. Absorption, Distribution, and Physiological Behavior of Calcium and Phosphorus in Farm Animals; cooperative with the UT-AEC Agric. Res. Lab.
- Hatch 65 The Detection of Animals Heterozygous for Recessive Bovine Dwarfism; cooperative with the U. S. Department of Agriculture.
- Hatch 66 The Effects of Radiation on Reproductive Physiology in Farm Animals; cooperative with the UT-AEC Res. Lab.
- Hatch 67 Ripening of Beef from Cattle Produced Under Different Feeding Methods as Related to B-Vitamin Content; cooperative with Home Economics.
- Hatch 68 Carcass Value Investigations with Beef.
- Hatch 69 Expanded Study and Evaluation of Diagnostic Measures in **Vibrio Fetus** Infection of Cattle and Sheep (contributing to Regional Proj. S-30).
- Hatch 70 Evaluation of the Adaptability of Existing Breeds and Commercial Types of Sheep for the Production of Early Milk Fat Lambs (contributing to Regional Proj. S-29).

Hatch	71	Factors Affecting Feed Utilization by Ruminants.
Hatch	72	Evaluation of Roughages for Beef Cattle.
Hatch	73	The Improvement of the Producing Ability of Swine Through Performance Testing and Breeding Methods.
Hatch	74	Evaluation of Control Measures Against Anaplasmosis; cooperative with the U. S. Department of Agriculture and Tennessee Department of Agriculture.
Hatch	176	Performance of Growing-Finishing Swine on Concrete and Pasture.
State	2	Swine Testing.
State	3	Effects of Fluorine Levels of Soil and Water on Grazing Cattle Under Different Systems of Management.

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Performance of Beef Steers Fed Small Quantities of a Tranquilizer. Tenn. Farm and Home Sci. Prog. Rep. 36, Dec. 1960.

Meyer, Bernadine, Juanita Thomas, Ruth Buckley, and J. W. Cole.

The Quality of Grain-Finished and Grass-Finished Beef as Affected by Ripening. Food Technology, 14(1):4-7, 1960.

Orme, L. E., J. W. Cole, C. M. Kincaid, and R. J. Cooper.

Predicting Total Carcass Lean in Mature Beef From Weights of Certain Entire Muscles. Jour. An. Sci., 19(3):726-734, 1960.

Saffle, R. L., and J. W. Cole.

Fasting Effects on Dressed Yields, Shrinkage, and pH of Contractile Tissue in Swine. Jour. An. Sci., 19(1): 242-248, 1960.

BOTANY

Proj. No.	Research Project Titles
Hatch 75	Breeding and Genetics of Crimson Clover.
Hatch 77	Breeding and Genetics of Lespedezas.
Hatch 78	Use of Ionizing Radiations in Crop Improvement; cooperative with the UT-AEC Agric. Res. Lab.
Hatch 79	Production and Improvement of Cotton Varieties Suitable to Tennessee Conditions; cooperative with the U. S. Department of Agriculture.
Hatch 80	Oat Breeding.
Hatch 81	Barley Breeding.
Hatch 136	Breeding for Improvement in Wheat Varieties to Include Resistance to Disease, Hessian Fly, and Changes in Morphological Characters; cooperative with the Entomology and Plant Pathology Departments and the U. S. Department of Agriculture.

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Proj. No.	Research Project Titles
Hatch 88	Feeding Thyroidally Active Materials to Dairy Cows.

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| Hatch | 89 | The Effects of Processing and Handling Upon the Livability and Fertility of Bull Spermatozoa. |
| Hatch | 92 | Development of Strains of Purebred Jerseys Especially Adapted for High Milk Production Under Maximum Grazing and Forage Conditions; cooperative with U. S. Department of Agriculture (contributing to Regional Proj. S-3). |
| Hatch | 93 | Effect of Different Growth Rates and Different Growth Periods Upon the Lactation of Dairy Heifers. |
| Hatch | 95 | The Roles and Interrelationships of Sodium, Potassium, Calcium and Phosphorus in Milk Secretion in the Dairy Cow; cooperative with the UT-AEC Agric. Res. Lab. |
| Hatch | 150 | Raising Dairy Calves; cooperative with the U. S. Department of Agriculture. |
| Hatch | 151 | Importance of the Dry Period and Management of Dairy Cows During the Dry Period. |
| Hatch | 161 | Evaluation of Forages for Dairy Cattle. |
| Hatch | 165 | Quality and Shelf Life of Dairy Products in the Marketing Channels. |
| Hatch | 180 | Fission Product Distribution in Milk and Dairy Products; cooperative with the UT-AEC Agric. Res. Lab. |
| State | 6 | Mechanical Handling of Silage; cooperative with the Agricultural Engineering and Animal Husbandry-Veterinary Science Departments. |

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| State | 5 | The Effects of Feeding Aureomycin as a Supplement to the Ration of Lactating Dairy Cows. |
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ENTOMOLOGY

Proj. No.	Research Project Titles
Hatch 34	Corn Improvement; cooperative with the Department of Agronomy and the U. S. Department of Agriculture.
Hatch 49	Determination of Residues from Certain Pesticides When Applied for Normal and Experimental Control of Insects and Diseases of Fruits and Forage Crops in Tennessee; cooperative with the Department of Agronomy (contributing to Regional Proj. S-22).
Hatch 96	A Study of the Insects Attacking Legumes with Special Reference to Alfalfa and Soybeans.
Hatch 97	A Study of the Life History, Ecology, and Control of Army Worms, Pseudaletia Unipuncta , and Related Species (contributing to Regional Proj. S-25).
Hatch 98	A Study of the Life History and Means of Control of Insects That Affect the Growth of Cotton.
Hatch 99	Studies on Soil Insecticides with Special Reference to the Control of the Elongate Flea Beetle, Systema Elongata .
Hatch 100	Evaluation of New Insecticides.

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| Hatch 101 | A Study of the Life History and Control of the Strawberry Leaf Roller, <i>Ancylis Comptana</i> , and Some Related Aspects of Strawberry Insect Control. |
| Hatch 136 | Breeding for Improvement in Wheat Varieties to Include Resistance to Disease, Hessian Fly, and Changes in Morphological Characters; cooperative with the Botany and Plant Pathology Departments and the U. S. Department of Agriculture. |
| State 15 | Impact of Mechanization on Costs and Returns in Cotton Production; cooperative with the Agricultural Economics and Rural Sociology, Agricultural Engineering, and Agronomy Departments. |

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| Hatch 83 | Preservation of Fruits and Vegetables by Freezing. |
| Hatch 86 | Quality of Frozen Green Snap Beans as Affected by Methods of Transportation, Processing, Duration and Temperature of Storage; cooperative with the Department of Bacteriology. |
| Hatch 173 | Group D Streptococci Isolated from Plants. |
| Hatch 177 | Flavonoid Pigments and Their Degradation in Processed Fruit and Vegetable Products. |

State	7	Electric Treatment of Plant Materials; cooperative with the Agricultural Engineering, Agronomy, and Home Economics Departments and the U. S. Department of Agriculture.
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Projects Concluded in 1960

Hatch	85	Factors Affecting Technology, Quality and Consumer Opinions on Colloid-Treated Strawberries Preserved by Freezing.
ES	385	Relative Costs and Effects on Quality and Market Value of Hand and Machine Capping of Strawberries for Processing.

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FORESTRY

Proj. No.	Research Project Titles
Hatch 102	Forest Management
Hatch 103	A Study of Forest Tree Species Adapted to the Cumberland Mountain Area of Tennessee.
Hatch 105	Stand Conversion Study
Hatch 106	Forest Tree Breeding
Hatch 107	Relationship of Soil and Other Site Factors to Forest Composition and Productivity.

Hatch	185	Forest Tree Genetics (contributing to Regional Proj. S-23).
State	8	Wood Preservation
State	12	Fertilization of Shade Trees on Lawns; cooperative with the Department of Horticulture.

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Hatch 67	Ripening of Beef from Cattle Produced Under Different Feeding Methods as Related to B-vitamin Content; cooperative with the Department of Animal Husbandry-Veterinary Science.
Hatch 108	Bone Density Measurements as a Method of Assessing Calcium and Phosphorus Status.
Hatch 110	The Utilization and Requirements for Calcium, Phosphorus, and Magnesium and Their Interrelationships with Other Nutrients in Preadolescent Children (contributing to Regional Proj. S-28).
Hatch 113	The Effect of Selected Properties of Raw Cotton Upon Product Quality and Serviceability; cooperative with the U. S. Department of Agriculture (contributing to Regional Proj. SM-18).

- Hatch 116 A Study of Procedures to Use with Washing Machines to Obtain Results Satisfactory to Families from the Standpoint of Cost and Soil Removal.
- Hatch 158 Educational and Vocational Goals of Rural Youth in Tennessee (contributing to Regional Proj. S-48).
- Hatch 170 Decision-Making Factors in Consumer Buying of Dairy Products (contributing to Regional Proj. SM-13).

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Hatch 23	Buying Policies and Other Practices in the Tennessee Vegetable Industry; cooperative with the Department of Agricultural Economics and Rural Sociology (contributing to Regional Proj. SM-8).
Hatch 24	Expansion of Demand for Horticultural Specialties; cooperative with the Department of Agricultural Economics and Rural Sociology.
Hatch 32	Chemical Weed Control; cooperative with the Agricultural Engineering and Agronomy Departments.
Hatch 117	Breeding for Fireblight Resistance.
Hatch 118	A Comparative Study of Inheritance in the Cultivated Raspberry With Reference to Certain Diseases and to Fruiting Habits.
Hatch 119	Breeding and Selection of Blackberries, Including Dewberries.
Hatch 121	Inheritance in Garden Beans With Reference to Resistance to Mexican Bean Beetle and Other Insects, Nematodes, Diseases, Southern Adaptation, and Commercial Quality.
Hatch 123	Mineral Nutrition of Vegetable Crops.
Hatch 125	Mineral Nutrition of Fruit Crops.
Hatch 126	Vegetable Variety Investigations.
Hatch 127	Fruit Variety Investigations.
Hatch 128	Propagation of Fruit and Ornamental Plants.
Hatch 154	Kind and Variety Investigations of Ornamentals.
Hatch 157	Management and Evaluation of Plants for Hedges, Screens, and Windbreaks.

Hatch 167	Breeding Tomatoes for Tennessee Markets With Emphasis on Earliness and Disease Resistance; cooperative with the Department of Plant Pathology.
Hatch 174	Breeding Strawberries for Tennessee Markets with Emphasis on Climatic Adaptability and Disease Resistance; cooperative with the Department of Plant Pathology.
Hatch 187	Storage and Handling of Evergreen Nursery Stock.
State 12	Fertilization of Shade Trees on Lawns; cooperative with the Department of Forestry.
State 16	Development of Lima Beans Having Specific Seed Coat Colors.
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Hatch 188	Measurement of Standard Cotton Fiber Properties; cooperative with the U. S. Department of Agriculture.

Projects Concluded in 1960

- Hatch 129 Theory of Textile Fabrics; cooperative with the U. S. Department of Agriculture.
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| Hatch 132 | Breeding Disease-Resistant Tobacco; cooperative with the U. S. Department of Agriculture. |
| Hatch 135 | Control of Cotton Verticillium Wilt; cooperative with the UT-AEC Agric. Res. Lab. and the U. S. Department of Agriculture. |
| Hatch 136 | Breeding for Improvement in Wheat Varieties to Include Resistance to Disease, Hessian Fly, and Changes in Morphological Characters; cooperative with the Botany and Entomology Departments and the U. S. Department of Agriculture. |
| Hatch 138 | Biology and Control of Plant Parasitic Nematodes; cooperative with the U. S. Department of Agriculture (contributing to Regional Proj. S-19). |
| Hatch 139 | Associations of Soil Microorganisms as Related to Plant Diseases (contributing to Regional Proj. S-26). |
| Hatch 140 | Evaluating New Fungicides. |
| Hatch 167 | Breeding Tomatoes for Tennessee Markets with Emphasis on Earliness and Disease Resistance; cooperative with the Department of Horticulture. |

Hatch 174	Breeding Strawberries for Tennessee Markets with Emphasis on Climatic Adaptability and Disease Resistance; cooperative with the Department of Horticulture.
State 4	The Identification and Control of Strawberry Virus Diseases; cooperative with the Tennessee Department of Agriculture.
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Hatch 141	Drugs in the Control of Internal Parasites of Poultry.
Hatch 144	Influence of Environment on Performance of Hens.
Hatch 146	Amino Acid Supplementation of Hydrolyzed Poultry Feathers for Use in Poultry Feed.
Hatch 147	Relationship of Protein to Energy for Laying Hens.
Hatch 152	Radiation Effects on the Growth of Broilers; cooperative with the UT-AEC Agric. Res. Lab. (contributing to Regional Proj. S-41).
Hatch 155	The Influence of Light Upon Performance of Domestic Chickens.
Hatch 160	Improving Diets for Broilers and Roasters.
Hatch 168	Effects of Restricting Feed Intake to Growing Pullets.
Hatch 172	Housing for Chicks; cooperative with the Department of Agricultural Engineering.
Hatch 178	Value of Various Grades of Grains for Poultry.

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UT-AEC 10	Physiology and Pathology of Externally-Irradiated Large Animals.

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- UT-AEC 12 Chemistry of Fission Products and Related Nuclides in Soils and Biological Materials.

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| B. J. DeMOTT, Associate Dairy Husbandman ³ | R. O. THOMAS, Assistant Husbandman,
Jackson |
| S. A. HINTON, Associate Dairy Husbandman | |
| R. H. LUSH, Dairy Husbandman | |

ENTOMOLOGY

- | | |
|---------------------------------------|--|
| W. W. STANLEY, Entomologist | S. E. BENNETT, Assistant in Entomology |
| C. A. THOMAS, Assistant in Entomology | |

FOOD TECHNOLOGY

- | | |
|---|--|
| M. R. JOHNSTON, Head of Department | J. L. GRAHAM, Assistant in Food Technology |
| J. D. FOX, Assistant in Food Technology | I. E. McCARTY, Associate Chemist |
| G. D. GERNON, Associate Food Technologist | J. O. MUNDT, Associate Bacteriologist |

FORESTRY

EYVIND THORBJORNSEN, Assistant Forest
Geneticist
S. L. BARRACLOUGH, Forester (on leave)

J. T. BEAVERS, Assistant Forester,
Grand Junction
J. S. KRING, Forester, Harriman

HOME ECONOMICS

LURA M. ODLAND, Dean
IDA A. ANDERS, Consultant in Textiles
MYRA L. BISHOP, Consultant in Home
Management
RUTH BUCKLEY, Consultant in Foods
SIGRID H. CHILDERS, Assistant Textile
Chemist
LORNA J. GASSETT, Associate in Home
Management
RUTH L. HIGHBERGER, Consultant in
Family Life
H. D. HOLLOWAY, Psychologist
PHYLLIS ILETT, Family Economist
KATHLEEN M. MCCOOK, Assistant in
Food Economics
ROSSIE L. MASON, Assistant Human
Nutritionist

BERNADINE MEYER, Food Economist
ELISE MORRELL, Assistant Human
Nutritionist
MARY A. MYSINGER, Assistant Food
Economist
MARY E. PURCHASE, Associate in Home
Management
HELEN M. REED, Assistant Family
Economist
FRANCES A. SCHOFIELD, Human
Nutritionist
J. T. SMITH, Associate Human Nutritionist
CAROLYN A. WERMAN, Assistant Textile
Chemist
DOROTHY E. WILLIAMS, Human
Nutritionist

HORTICULTURE

B. S. PICKETT, Head of Department
D. D. BAIRD, Assistant in Horticulture
J. S. ALEXANDER, Assistant Horticulturist
T. R. GILMORE, Associate Horticulturist,
Crossville
J. S. OHR, Assistant in Horticulture
P. H. PARHAM, Assistant Horticulturist,

W. E. ROEVER, Associate Horticulturist
A. B. STRAND, Associate Horticulturist
Dandridge
H. D. SWINGLE, Associate Horticulturist
HENDRIK van de WERKEN, Assistant
Horticulturist

INFORMATION

R. L. HAMILTON, Head of Department
BETTY K. ADAMS, Agricultural Librarian
FRED BERGGREN, Assistant Editor

R. C. McDADE, Visual Aids Specialist
FLETCHER SWEET, Associate Editor
R. E. WRIGHT, Editorial Assistant

PHYSICS

K. L. HERTEL, Physicist
P. R. EWALD, Associate Physicist¹
R. S. KROWICKI, Assistant Physicist¹

C. B. LANDSTREET, Assistant Physicist¹
REBA LAWSON, Assistant in Physics¹
J. V. LEE, Assistant in Physics

PLANT PATHOLOGY

J. O. ANDES, Head of Department
A. Y. CHAMBERS, Assistant Plant
Pathologist, Jackson
B. Y. ENDO, Associate Plant Pathologist,¹
Jackson
J. M. EPPS, Associate Plant Pathologist,¹
Jackson

E. L. FELIX, Associate Plant Pathologist
L. F. JOHNSON, Associate Plant Pathologist
D. H. LATHAM, Associate Plant Pathologist,
Springfield
H. E. REED, Associate Plant Pathologist
H. A. SKOOG, Associate Plant Pathologist,¹
Greeneville

POULTRY

O. E. GOFF, Head of Department
J. K. BLETNER, Associate Poultry
Husbandman
B. J. McSPADDEN, Associate Poultry
Husbandman
R. P. MITCHELL, Assistant in Poultry

H. V. SHIRLEY, JR., Associate Poultry
Husbandman
D. B. SHOAF, Assistant in Poultry
R. L. SMITH, Assistant in Poultry
J. F. STEPHENS, Assistant in Poultry
R. L. TUGWELL, Associate Poultry
Husbandman

MAIN STATION

J. N. ODOM, General Superintendent of Farms

BRANCH STATIONS

- | | |
|--|--|
| <p>E. L. BOHANAN, Assistant Superintendent,
Plateau Experiment Station, Crossville</p> <p>E. J. CHAPMAN, Superintendent, Middle
Tennessee Experiment Station, Spring Hill</p> <p>J. H. FELTS, Superintendent, Tobacco
Experiment Station¹, Greeneville</p> <p>B. P. HAZLEWOOD, Superintendent, West
Tennessee Experiment Station, Jackson</p> | <p>J. A. ODOM, Superintendent, Plateau
Experiment Station, Crossville</p> <p>J. R. OWEN, Superintendent, Dairy
Experiment Station,¹ Lewisburg</p> <p>L. M. SAFLEY, Superintendent, Highland
Rim Experiment Station, Springfield</p> |
|--|--|

UT-AEC AGRICULTURAL RESEARCH LABORATORY

- | | |
|--|--|
| <p>N. S. HALL, Laboratory Director</p> <p>J. MERRILL BIRD, Superintendent</p> <p>D. L. ANDERSON, Associate Veterinarian²</p> <p>D. F. ANDREWS, Assistant in Animal
Husbandry</p> <p>J. W. AUSTIN, Assistant in Animal
Husbandry</p> <p>J. S. BATSON, SR., Laboratory Technician</p> <p>W. H. BOLING, Research Technician</p> <p>SHEILA R. BOND, Research Technician</p> <p>NANCY M. BOWLES, Research Technician</p> <p>D. G. BROWN, Scientist</p> <p>P. T. CHANDLER, Assistant in Dairy
Husbandry</p> <p>JORGE CHIRIBOGA, Associate Scientist</p> <p>T. G. CLARK, Research Technician</p> <p>PHYLLIS N. COLLIER, Sr. Laboratory
Technician</p> <p>M. J. CONSTANTIN, Assistant Scientist</p> <p>FANNIE H. CROSS, Research Technician</p> <p>PEGGY J. EAST, Sr. Laboratory Technician</p> <p>B. H. ERICKSON, Assistant Scientist</p> <p>R. G. GAST, Assistant Scientist</p> | <p>W. J. HARRIS, Sr. Animal Technician</p> <p>H. C. HOLT, Research Technician</p> <p>E. W. HUPP, Associate Scientist</p> <p>E. L. IRWIN, Research Technician</p> <p>D. F. JOHNSON, JR., Scientist</p> <p>L. P. JONES, Associate Scientist</p> <p>T. H. KAMAL, Assistant Scientist</p> <p>A. O. LUNDEN, Assistant Scientist</p> <p>W. A. LYKE, Research Technician</p> <p>R. C. McILHENNY, Associate Scientist</p> <p>J. E. MITCHELL, Sr. Animal Technician</p> <p>F. R. MRAZ, Associate Scientist</p> <p>N. R. PARISH, Research Assistant</p> <p>MAREK RAKOWER, Associate Scientist</p> <p>R. A. REYNOLDS, Research Assistant</p> <p>D. N. ROY, Assistant Scientist</p> <p>R. F. SELLERS, Research Technician</p> <p>D. P. SASMORE, Research Veterinarian²</p> <p>JOSE SOUTO, Associate Scientist</p> <p>R. A. TEEKELL, Associate Scientist</p> <p>E. J. THORPE, Associate Scientist</p> <p>R. E. THOMAS, Research Veterinarian</p> <p>J. W. WHEELER, Sr. Laboratory Technician</p> |
|--|--|

¹Cooperative with U. S. Department of Agriculture.

²On assignment with Veterinary Corps, United States Army.

³Cooperative with UT-AEC Agricultural Research Laboratory.

PERSONNEL CHANGES

APPOINTMENTS

- J. H. ANDERSON, Head, Agricultural Engineering, June 1, 1960
- D. D. BAIRD, Assistant in Horticulture, July 1, 1960
- J. S. BATSON, Sr. Laboratory Technician, September 1, 1960
- W. H. BOLING, Research Technician, April 18, 1960
- SHEILA R. BOND, Research Technician, February 8, 1960
- NANCY M. BOWLES, Research Technician, April 1, 1960
- M. J. CONSTANTIN, Assistant Scientist, June 7, 1960
- PEGGY J. EAST, Sr. Laboratory Technician, July 1, 1960
- B. H. ERICKSON, Assistant Scientist, October 1, 1960
- J. D. FOX, Assistant in Food Technology, November 1, 1960
- G. D. GERNON, Associate Food Technologist, March 1, 1960
- J. L. GRAHAM, Assistant in Food Technology, July 1, 1960
- C. F. GREGORY, Assistant in Agronomy, September 16, 1960
- R. L. HAMILTON, Head, Information, December 15, 1960
- W. J. HARRIS, Sr. Animal Technician, August 8, 1960
- RUTH L. HIGHBERGER, Consultant in Family Life, September 1, 1960
- H. C. HOLT, Research Technician, July 1, 1960
- D. F. JOHNSON, JR., Scientist, August 1, 1960
- T. H. KAMAL, Assistant Scientist, February 1, 1960
- L. H. KELLER, Assistant Agricultural Economist, September 1, 1960
- J. V. LEE, Assistant in Physics, September 1, 1960
- J. T. MILES, Head, Dairy Husbandry, September 1, 1960
- D. L. MONTGOMERY, Assistant in Agronomy, September 1, 1960
- MARY A. MYSINGER, Assistant Food Economist, July 1, 1960
- J. S. OHR, Assistant in Horticulture, September 1, 1960
- R. G. PALMER, Assistant in Agronomy, September 1, 1960
- P. H. PARHAM, Assistant Horticulturist, Jackson, February 15, 1960
- D. G. PARIS, Assistant Agricultural Economist, August 1, 1960
- S. P. PARRY, Assistant Agricultural Economist, September 1, 1960
- MAREK RAKOWER, Associate Scientist, February 17, 1960
- C. B. RAMSEY, Assistant Animal Husbandman, June 1, 1960
- J. H. RANKIN, Assistant in Animal Husbandry, October 1, 1960
- D. N. ROY, Assistant Scientist, February 1, 1960
- H. G. RUTHERFORD, Assistant in Agricultural Economics, February 16, 1960
- C. T. SARTEN, Assistant in Agronomy, September 21, 1960
- J. T. SMITH, Associate Human Nutritionist, September 1, 1960
- R. L. SMITH, Assistant in Poultry, September 1, 1960
- J. E. THIGPEN, Assistant in Dairying, July 1, 1960
- E. J. THORPE, Associate Scientist, June 1, 1960
- J. W. WHEELER, Sr. Laboratory Technician, June 13, 1960
- B. L. WHITTENBURG, Assistant in Animal Husbandry, Spring Hill, July 11, 1960

RESIGNATIONS

- J. A. BACON, Research Technician, November 30, 1960
- C. W. BOCKHOP, Head, Agricultural Engineering, March 5, 1960
- MARY A. BUEHLER, Assistant Chemist, August 10, 1960
- R. G. BUESCHER, Sr. Laboratory Technician, December 31, 1960
- L. M. CARPENTER, Assistant in Dairying, April 1, 1960
- C. J. CRAVEN, Associate Physicist, September 30, 1960
- L. A. DUNGAN, Assistant in Agronomy, June 30, 1960
- G. N. DUREN, Assistant in Horticulture, February 29, 1960
- W. B. EWING, Assistant in Agricultural Economics, September 11, 1960
- C. D. GADDY, Assistant in Animal Husbandry, March 16, 1960
- D. E. GONZALEZ, Assistant in Agronomy, September 15, 1960
- U. K. HWANG, Assistant Scientist, August 18, 1960
- MARY E. KEISTER, Consultant in Family Life, August 31, 1960
- E. J. LONG, Group Leader, UT-India Agricultural Program, November 6, 1960
- REBECCA A. MALCOMB, Assistant in Food Technology, June 30, 1960
- R. H. MAYO, Assistant Scientist, June 30, 1960
- J. D. MILLER, Research Technician, August 31, 1960
- C. S. MURPHEY, Assistant in Agricultural Economics, August 31, 1960
- H. B. PACE, Research Assistant, May 13, 1960
- S. L. PARKISON, Assistant in Dairying, March 16, 1960
- B. M. PIPER, Assistant in Agronomy, July 1, 1960
- R. G. F. SPITZE, Agricultural Economist, September 16, 1960

RETIRED

- C. E. WYLIE, Head, Dairy Husbandry, August 31, 1960